# 1993 Index


## A

Aboveground tanks, insulated, 87
Acoustic smoke sensors, 385
Air flow. *See also* Venting, fire
  compressible blocks for stoppings, 134, 143-144
  electronic equipment fires, 37, 39, 45-47
  fan pressurization and, 374, 376-380
  to maintain hot smoke level, 246-248
Air-handling spaces, electrical equipment in, 88-89
Air sampling smoke detectors, 48, 49-50, 55-57
Aircraft exit signs, 155-156
Alcohol use in fatal fires, 183, 184, 186, 187, 189-191
Aluminum, 338, 339, 348
Andersson, Hans, 350
*Appreciation to Referees*, 84
Arson investigation, Swedish, 350-373
  dark factor in, 350, 354-355
  insurance company data, 352, 353, 356
  juvenile delinquency, 364-367
  location of arson, 362-364
  losses, 353-354, 356-360
  motives for arson, 350, 359-362, 364-367
  police data, 351-353, 356
  population density, 367-370
  in Stockholm, 370-371, 373
  trend in arson occurrences, 356
ASTM E-5, 196, 199, 292-293
ASTM E-84, 132, 209
ASTM E-119, 4, 5-6, 12, 133
ASTM E-162, 132, 144
ASTM E-779-81, 375
ASTM STP 1133, 93

## B

Backdrafts, 298-316
  defined, 298
  Fire Simulation Technique (FIRST) model for, 308-312
  scenario, 299-300
  simulation of, 300-308, 312-315
Bangdiwala, Shrikant I., 183
Beard, Alan, 281
Bielen, Richard P., 80
Bigglestone Award, Harry C., 99
Bill, Robert G., Jr., 203
Bishop, Steven, 281
Blocks, compressible. *See* Fire-resistant cardboard blocks
*Book Review*, 289
Boyce, P., 177
British Standard fire resistance test, 285-286
Building codes, development of, 69-70
Building design and fire safety, 88
Bulk retail facilities, flammable and combustible liquids storage, 80-81
Butts, John, 183

## C

Cable installations
  fuel and fire characteristics, 38-42
  location of detection devices for, 42-46, 51-54
  selection of detection devices for, 41, 47-57
Cable tunnels, 94-95
Calorimeter to test wall assemblies, 332-349
Carbon dioxide, total flooding, 383
Carlton, Conrad M., 100
Ceiling dampers, 94
Ceilings, tunnel. *See* Radiation in tunnel or cylinder
Cementitious protection materials, 7, 8, 12, 14
Children
  arson by, 350, 360, 362, 364-367
  fire safety skills, 268-280
Chittum, C., 178
Chlorides as electronics contaminants, 226, 227, 234-237, 243-245
Cider, Lennart, 226
Collins, B. L., 154
Columns, 285-286. *See also* Steel columns
*Communicating Technical Information*, 1
Compartment fires, backdrafts in. *See* Backdraft
Computer programs
  Fire Simulation Technique (FIRST), 308-312
  Firecalc, 246, 260-262
  FIRES-T3 heat transfer model, 4-16
  Hazard I, 90
  Plume, 246, 252-264
  "THE" Sprinkler Program, 60-68
  *WPI Fire* model, 90
Computers. *See* Electronic equipment
Contamination control, 376
Cup burners, scale effect of, 22-33
*Current Research*, 76
Cylinder, radiation in. *See* Radiation in tunnel or cylinder

## D

Dahir, M. S., 154
Dampers, ceiling, 94
Deflagration, rapid. *See* Backdraft
Diffusion flame, 22-23, 32, 305
Disabilities, fatal fire factor, 183, 186-191
Drysdale, Dougal, 281

## E

Elderly in fatal fires, 186-187, 189-191
Electrical equipment in air-handling spaces, 88-89
Electrochemical migration, 227
Electronic equipment
  air flow and fire detection, 37, 39, 45-47
  compartment configuration and fire detection, 42-44, 46-47
  conformal coating, 226, 245
  early fire detection for, 34-59
  fuel/fire characteristics, 35-38, 41-42
  location of detection devices for, 42-46, 51-54
  selection of detection devices for, 41, 47-57
  smoke-contaminated
    cleaning methods, 226, 230, 231-234, 244

cleaning test design and procedure, 227-234
need for cleaning, 227
surface-mounted, 226-245
through-hole, 226, 227
Enclosure integrity, 374, 375, 380-382
Energy conservation, 375-376
Engineering fire safety, 88, 92, 297
Excess pyrolyzates, 298, 302
Exit signs, visibility of
in aircraft cabins, 155-156
green vs. red, 154, 157, 158, 172-173, 175, 179-181
standards for, 157-159
testing methods, 154-157, 159-161, 178-179
visibility assessment, 154-157, 161-173, 177-178, 181-182
Expanded polystyrene (EPS), 132, 134, 135, 337, 338, 348
Explosions, backdraft. *See* Backdraft
Extinguishment
of lithium fires, 100-130
scale effect of cup burner on flame-extinguishing concentrations, 22-33

F

Fan pressurization, 374-386
apparatus, 374-375
to detect smoke leaks, 384-385
fire protection uses
halon, 377-378, 380-382
other than halon, 382-384
non-fire protection uses, 375-376
technology concepts, 376-380
Fatal residential fires, risk factors for, 183-193
Fire balls, 298, 300, 302, 303, 305-307, 312
Fire barriers
stoppings in mines. *See* Fire-resistant cardboard blocks
testing smoke control, 384
*Fire* (book), 289-290
Fire detection
for cable installations. *See* Cable installations
for electronic equipment. *See* Electronic equipment
research project, 387-388
Fire models users' group, 90
Fire protection
costs of, 69-75
fan pressurization used for, 380-385
for historic buildings, 97-98
spray-applied, 3-4, 6, 7-9, 20
of steel columns, 3-21
Fire resistance
British Standard fire resistance test for columns, 285-286
of steel columns, 3-21
Fire-resistant cardboard blocks, 131-153
air leakage, 134, 143-144
candidate materials, 135-152
compressibility and strength, 133-134, 136, 138-139
economics, 134-135
fire resistance, 133, 136, 139-142, 144-152
moisture resistance, 131, 134, 142-143
performance requirements, 132-133
surface flammability, 134, 144
use of, 131-132
Fire safety
children, teaching to, 268-280
computing cost in modern society, 69-75
engineering, 88, 92, 297
*Fire Safety Re-engineering*, 297
Fire Simulation Technique (FIRST) model, 308-312
Fire tests
columns, 5-6, 9-13, 285-286
cup burner flame-extinguishment tests, 22-32
electrical equipment installed in air handling spaces, 88-89
limited-water-supply sprinklers, 214-222
sprinklers in paint spray booths, 318, 321-329
wall assemblies, 332-349
Firecalc software program, 246, 260-262
FIRES-T3 heat transfer model, 4-16
Flammable and combustible liquids
in consumer packaging, 294-295
insulated aboveground tanks, 87
in retail facilities, 80-81
Flashovers in tunnels, 287-288
Fleischmann, Charles M., 298

G

Glass bulb sprinklers in paint spray booths
coverings for, 317, 318, 320-321, 322, 325-330
experiment design, 318-321
large-scale fire tests, 318, 322-329
paint accumulation and, 317-318, 319-321, 322, 328, 330
plunge tests, 318, 321-322
quick-response sprinklers, 317, 319, 327, 328-330
Grant, Casey C., 374
Gravity current, 298, 299-300, 303, 307, 308, 312
*Greek Fire*, 201
Grubits, S. J., 246
Guassian temperature distribution, 249, 250, 266-267
Gypsum board, 337, 338, 339, 348

H

Halogens in insulating materials, 39
Halon 1301
alternative agents, 22, 32
fan pressurization and, 374, 377-378, 380-382
scale effect of cup burner on flame extinguishing concentrations, 22-33
*Standard for Safety for Halon 1301 Recovery/Recycling Equipment*, UL 2083, 92-93
Hazard, overpressure, 300, 301
Hazard I model, 90
Heat detectors, 47-48, 56
Heating incidents as fire cause, 183, 186, 188
Historic buildings, 97-98
Holborn, Paul, 281
Hotlayer software, 260-262, 264
HVAC systems, 37, 379-380, 381, 383

## I

In-duct smoke detectors, 49, 56
Incipient smoke detectors, 48, 49-50, 55-57
Infrared scanning device, 385
Ingason, Haukur, 317
Insulated aboveground tanks, 87
Insulating materials
  cable, 38-42
  corrosivity and toxicity, 38-40
  halogens in, 39
Intermediate-scale calorimeter to test wall assemblies, 332-349
Intumescent paint, 139-140, 144, 147, 148, 149, 152
Ionization smoke detectors, 48, 49, 52
ISO cup burner, 22-24, 27, 30-31
Iwata, Yusaku, 22

## J

Jones, Russell T., 268
Juvenile arson fires, 350, 364-367

## K

Kraft cellulose fiber, 138
Kung, Hsiang-Cheng, 203

## L

Large-scale fire tests
  glass bulb sprinklers, 318, 322-329
  for wall assemblies, 332, 333
Light-scattering-type smoke detectors, 48, 49-50
Limited-water-supply sprinklers for manufactured homes, 203-225
  discharge characteristics, 204, 205, 214, 223
  need for, 203-204
  prototype development and evaluation, 212-223
  research program, 204-205
  spacing of, 205-212, 222-223
Linear-beam smoke detectors, 50-51, 56
Linzer, Mary A., 183
Liquid fuels, cup burner flame-extinguishment tests, 22-32
Lithium fires, extinction of, 100-130
Los Angeles Residential Program (LARP), 203, 205, 207, 212, 214
Low energy fires, detection of, 35-38, 41, 42-44
Luzik, Steven J., 131

## M

Madrzykowski, D., 154
Manufactured homes
fatal fires, 183, 184, 186, 188-189, 190-191
sprinklers. *See* Limited-water-supply sprinklers for manufactured homes
Meacham, Brian J., 34
Meade, William, 69
Mental illness, arson fire factor, 350, 360, 362
Milke, James A., 3
Mine Safety and Health Administration (MSHA), 132, 133, 134
Mines, compressible blocks for stopping construction in. *See* Fire-resistant cardboard blocks
Mobile homes. *See* Manufactured homes
Mowrer, Frederick W., 60

## N

National Fire Laboratory (NFL) strategic plan, 76-79
National Fire Protection Research Foundation, 80-81, 99, 387
Natural gas, 302, 303
*News and Meetings*, 87, 196, 291, 387
NFPA 90, 203-205
NFPA 33, 318
NFPA 2001, 382, 383
NFPA 101-26, 157
NFPA 12A, 375, 382, 383
NFPA 13D, 203, 210, 211, 213, 223
NIST, 69, 89, 91, 197-198, 200, 291, 308, 388
North Carolina, fatal fires study, 183-193

## O

Oriented strand board (OSB), 337, 338, 348
Ouellette, M., 179
Overpressure hazard, 300, 301

## P

Pagni, Patrick J., 298
Paint. *See also* Intumescent paint
  layers affecting sprinkler response time, 317-318, 319-321, 322, 328, 330
  on wall assemblies, 339
Paint spray booths. *See* Glass bulb sprinklers in paint spray booths
Phenolic resin treatment for compressible blocks, 131, 132, 142-143, 144, 148, 152
Plume computer program, 246, 252-264
Plunge tests, sprinklers in paint spray booths, 318, 321-322
Polyisocyanurate (PIC), 132, 134, 135
Polymers, 39, 92
Polystyrene, flame-retarded. *See* Expanded polystyrene (EPS)
Polyurethane foam, 338, 339, 348
Premixed flame, 305, 306, 312
Program Plume, 246, 252-264
Propane, 302, 303, 304
*Protecting Our Heritage from Fire*, 97
Protective clothing, 93

## Q

Quick-response sprinklers, 317, 319, 327, 328-330

## R

Radiant panels, 334, 335
Radiation-absorption energy losses, 250, 266-267
Radiation in tunnel or cylinder
  British Standard fire resistance test, 285-286
  configuration factor for, 281-288

flaming upper surface, 287
flashover and, 287-288
hot upper surface, 286-287
radiative heat flux, 286
Randall, Jeff, 268
Rate of heat release (RHR), 332, 335, 348
Rental units, smoke detectors in, 191, 192
Residential fires (fatal), risk factors for, 183-193
Residential sprinklers
fatal fire prevention, 191
limited-water-supply, 203-225
standards for, 203
Retail facilities, flammable and combustible liquids storage, 80-81
Revenge/spite, arson fire factor, 350, 360-362
Rhein, Robert A., 100
Richardson, J. Kenneth, 76
RoofVent software program, 260-263
Rossotti, Hazel, 289
Runyan, Carol W., 183
Rural fires, risk factors for fatal, 183-193

S

Sacks, Jeffrey J., 183
Saito, Naoshi, 22
Saso, Yuko, 22
Service tunnels, 94-95
Shaw, James R., 332
Shestopal, V. O., 246
Smoke barriers, 384
Smoke control
air flow estimation for, 246-248
fan pressurization for, 383-385
software, 260-262
Smoke detectors
for electronic equipment and cables, 46-57
role in fatal fire prevention, 183, 184, 186-192
Smoke plume
electronic equipment fires, 36-37
estimation of air flow, 246-248
Plume computer program, 246, 252-264
theoretical model, 248-252
Smoking as fire cause, 183, 186, 188, 192
Smoky conditions, exit signs in. *See* Exit signs, visibility of
*Software Review*, 60
Sports center, smoke plume test, 256
Spot-type smoke/heat detectors, 46, 47, 48-49, 52, 56-57
Spray-applied fire protection, 3-4, 6, 7-9, 20
Sprinkler hydraulics computer program, 60-68
Sprinklers. *See also* Glass bulb sprinklers in paint spray booths; Limited-water-supply sprinklers for manufactured homes; Residential sprinklers
for electronic equipment protection, 56
flammable/combustible liquids storage, retail facilities, 81
quick-response, 317, 319, 327, 328-330
Squeeze blocks. *See* Fire-resistant cardboard blocks
Steel columns
effect of missing protection on fire resistance of, 3-21
flange exposure, 10, 12, 13-20
size and protection loss, 7, 14-16, 20
web exposure, 10, 13, 16, 18-20
Steel sheets, 338, 348
Stopping construction. *See* Fire-resistant cardboard blocks
Storage of flammable and combustible liquids, 80-81
Surface-mounted electronics, smoke-contaminated, 226-245
Swedish arson investigation. *See* Arson investigation, Swedish

T

Tanks, insulated aboveground, 87
*Technical Notes*, 154, 183, 281, 350, 374
Technical writing, 1-2
Telecommunications industry, fire protection for, 34-35
Tests. *See also* Fire tests
exit signs, visibility of, 154-157, 159-161, 178-179
smoke-contaminated electronic equipment cleaning test, 227-234
smoke plumes, 256
"THE" Sprinkler Program, 60-68
Thermoplastic insulating material, 39
Thermoset insulating material, 39
Thomas, David J., 69
Tomecek, David V., 3
Tunnels
cable and service, 94-95
radiation in. *See* Radiation in tunnel or cylinder

U

UL 2043, 88-89
UL 2083, 92-93
UL 2085, 87
UL 555C, 94
United States Fire Administration (USFA)
sprinkler research, 203, 204-205, 212, 214, 223
Urbas, Joe, 332

V

Vandalism as cause of arson fires, 350, 359-361
Venting, fire, 298, 299, 300, 302, 303-304, 305, 312
*Viewpoint*, 69

W

Wall assemblies, intermediate-scale calorimeter test for, 332-349
Watts, John M., 1, 97, 201, 289, 297
Webber, G., 181
Williamson, R. Brady, 298
Wood studs, 338, 339, 348
*WPI Fire* model, 90